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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,906	11/07/2005	Andrew Miller Cameron	M02B129	6895
20411 7590 09/05/2008 The BOC Group, Inc. 575 MOUNTAIN AVENUE MURRAY HILL, NJ 07974-2082				
EXAMINER				
CHEN, CHRISTINE				
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1793				
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09/05/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/517,906

**Applicant(s)**

CAMERON ET AL.

**Examiner**

CHRISTINE CHEN

**Art Unit**

1793

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 11-13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 11-13 are objected to because of the following informalities: In claim 11, the phrase "a non-oxidising gas, or a mixture of an oxidising gas and a non-oxidising gas" found on lines 3-4 should be replaced with "a non-oxidizing gas, or a mixture of an oxidizing gas and a non-oxidizing gas". Similarly, "oxidising gas" in line 1 of claim 12 should be replaced with "oxidizing gas" and "non-oxidising gas" in lines 1-2 of claim 13 should be replaced with "non-oxidizing gas." Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 10 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear as to which dimension (e.g. diameter, length, width, size) of the particle is 1 mm or less. For purposes of examination, the claim is interpreted as being drawn to a particle size of 1 mm or less.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-6 and 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahoney (EP 1092785) in view of Schlichting (US 5366537) and further in view of Curr (US 4425223).

Mahoney teaches injecting metal oxide particles into a liquid such as molten metal using a lance that produces a first stream comprising particles and a carrier gas surrounded by a second gas stream, formed of burning gases such as fuel and oxidant. The carrier gas may be oxygen or a gas mixture such as oxygen and argon. This teaching may be applied to the practice of metal refining (see [0003], [0007], [0019], [0023]-[0024]).

Mahoney, in teaching the injection of metal oxide particles into molten metal, does not disclose the supersonic speed of the two streams, the controlling of the speed of the two streams, and the injection of said particles into a ferroalloy.

Schlichting, in disclosing a process for introducing oxygen and particulate material into a refining furnace, teaches the delivery of a first particulate stream 53 at a speed between about Mach 0.75 and about Mach 2, surrounded by a second gas stream 51 delivered at about Mach 0.5 to Mach 1.5. Both ranges overlap with the supersonic range. Schlichting discloses a step of controlling the velocities of the two gas streams to minimize the migration of the particles from the first stream 53 through the second gas stream 51 into the surroundings (see Figure 1, Field of the Invention section, col. 3 lines 14-17, and col. 5 lines 49-54).

Neither Mahoney nor Schlichting disclose the injection of particles into a ferroalloy.

Curr, in disclosing a process for the refining of ferrochromium, teaches injecting metals such as ferrochrome and chromite fines with a size of less than 2 mm into molten ferrochromium metal (see col. 1 lines 15-17, Brief Summary of the Invention section, col. 2 lines 33-39 and claims 13-14).

It would have been obvious to one of ordinary skill in the art to modify the process of Mahoney with the velocities and controlling thereof by Schlichting in order to minimize the migration of particles from the first stream through the second stream and into the surroundings. Furthermore, it would have been obvious to one having ordinary skill in the art to modify the combined process of Mahoney and Schlichting with the ferroalloy and particulate material of Curr in order to facilitate the refining of ferrochromium.

With regards to the amount of iron recited in claim 3, the ferrochromium of Curr meets the described limitation of containing at least 30% by weight of iron (see col. 2 lines 10-23 and col. 2 lines 65-68).

With regards to the size of the particle as recited in claims 9-10, Curr discloses chromite fines with a size of less than 2 mm (see col. 1 lines 15-17). There is an overlap between the size of Curr and the claimed size limitation, resulting in a *prima facie* case of obviousness.

6. Claims 1-3, 7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahoney (EP 1092785) in view of Schlichting (US 5366537) and further in view of Higuchi (JP 08-092627).

The teachings of Mahoney and Schlichting disclosed in paragraph 5 above do not include the injection of particles into a ferroalloy.

Higuchi, in disclosing a refining process of stainless steel, teaches the top blowing or injection of a chromium oxide slag powder to a stainless steel melt (see English abstract, claims and Means for Solving the Problem section of Machine Translation).

It would have been obvious to one of ordinary skill in the art to modify the process of Mahoney with the velocities and controlling thereof by Schlichting in order to minimize the migration of particles from the first stream through the second stream and into the surroundings. Furthermore, it would have been obvious to one having ordinary skill in the art to modify the combined process of Mahoney and Schlichting with the ferroalloy and particulate material of Higuchi in order to facilitate the refining of stainless steel.

With regards to the amount of iron recited in claim 3, given the ferroalloy is stainless steel, it would be reasonable to expect the ferroalloy to meet the limitation of containing at least 30% by weight of iron.

7. Claims 1-2, 8-9, and 11-14 rejected under 35 U.S.C. 103(a) as being unpatentable over Mahoney (EP 1092785) in view of Schlichting (US 5366537) and further in view of Yamamoto (JP 62230953).

The teachings of Mahoney and Schlichting disclosed in paragraph 5 above do not include the injection of particles into a ferroalloy.

Yamamoto, in disclosing a method for refining ferromanganese, teaches the addition of manganese oxides to molten ferromanganese (see English abstract).

It would have been obvious to one of ordinary skill in the art to modify the process of Mahoney with the velocities and controlling thereof by Schlichting in order to minimize the migration of particles from the first stream through the second stream and into the surroundings. Furthermore, it would have been obvious to one having ordinary skill in the art to modify the combined process of Mahoney and Schlichting with the ferroalloy and particulate material of Yamamoto in order to facilitate the refining of ferromanganese.

8. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahoney (EP 1092785) in view of Schlichting (US 5366537) and further in view of any one of Curr (US 4425223), Higuchi (JP 08-092627), and Yamamoto (JP 62-230953), and even further in view of Fritz (WO0012767 used hereinafter with US 6558614).

None of Mahoney, Schlichting, Curr, Higuchi, and Yamamoto discloses the use of Laval nozzles in supersonic jet streams.

Fritz, in disclosing a method for producing a metal melt involving the charging of solid metal oxides and a lance for use in the described method, discloses a lance comprising a first axial gas supply tube terminating at its outlet wherein the mouth part of the tube is designed as a first Laval nozzle, a second tube surrounding the first tube terminating at its outlet, wherein the mouth part of the tube is designed as a second Laval nozzle, and a third tube for forming a supply duct, in particular for solid, fine grained to dust-like substances, wherein the outlet of the third tube is in a divergent part

of the first Laval nozzle. The Laval nozzle facilitates high velocities (see col. 1 lines 5-15, col. 5 lines 6-14, col. 7 lines 18-23 and Figure 5).

It would have been obvious to one of ordinary skill in the art to modify the combined process taught by Mahoney, Schlichting, and any one of Curr, Higuchi, and Yamamoto with the Laval nozzle and lance of Fritz in order to facilitate the refining of a ferroalloy in terms of speed (i.e. shorter processing time).

With regards to the combustion chamber as recited in claim 18, the cavity formed at the end of the lance seen in Figure 5 allows for the combustion of the fuel and oxygen (see Figure 5 and col. 5 lines 5-24).

9. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahoney (EP 1092785) in view of Schlichting (US 5366537) and further in view of Yamamoto (JP 62230953), and even further in view of Marukawa (GB 2054655).

None of Mahoney, Schlichting, and Yamamoto discloses the introduction of the particulate material and gas jet in relation to a larger refining operation.

Marukawa, in disclosing a refining process of steel, teaches a refining operation wherein the powder supplied together with a top-blowing oxygen jet operates during a two to eighteen minute interval of a twenty six minute refining operation (see Figure 2, p. 3 lines 46-51 and p. 4 lines 6-12). This overlaps with the limitations cited in claims 19 and 21.

It would have been obvious to one of ordinary skill in the art to modify the combined process taught by Mahoney, Schlichting and Yamamoto with the refining



operation of Marukawa in order to facilitate the production of a ferroalloy with high accuracy, in high yield and with great ease.

With regards to the limitation of claim 20, it is well known in the art to continue the gas jet after the introduction of the particulate material into the melt has ceased in order to allow for the complete entry of the particles to the melt.

### ***Double Patenting***

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 5 and 9 of copending

Application No. 10/512187 in view of any one of Curr (US 4425223), Higuchi (JP 08-092627), and Yamamoto (JP 62230953). The copending application teaches all the limitations of claim 1 except for the injection of the particulates into a ferroalloy melt. As discussed in the paragraphs above, the injection of the particulates into a ferroalloy melt

is taught by Curr, Higuchi and Yamamoto. It would have been obvious to one having ordinary skill in the art to modify copending application 10/512187 with the ferroalloy melt taught by any one of Curr, Higuchi, and Yamamoto in order to facilitate the refining of a ferroalloy.

This is a provisional obviousness-type double patenting rejection.

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTINE CHEN whose telephone number is (571)270-3590. The examiner can normally be reached on Monday-Friday 8:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/  
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Unit 1793

CC